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REMARKS

Claim 1-10, 12-21, 25, and 32-47 are currently pending in the application.

The Applicants' attorney, Dennis M. Carleton and Examiner Bernatz had a phone conference on February 26, 2004 to discuss the wording of the claims. A summary of that conversation will be supplied by Mr. Bernatz with the next office action.

The Examiner has rejected Claims 14, 19, 20, 25, 34-36, 42 and 43 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 1 and 2 of U.S. Patent 6,531,202 (Litvinov, et al.) in view of U.S. Patent 4,632,883 (Howard, et al.). The Examiner states that Litvinov claims a perpendicular magnetic recording disc comprising a substrate and a soft magnetic layer exhibiting magnetic anisotropy in a radial direction. The Examiner further states that Howard, et al. teaches that it is known in the art to use non-magnetic spacing materials between the substrate and the soft magnetic layers to improve the adhesion of the soft magnetic layer to the substrate.

In response, the Applicants have modified Claim 14 to include the limitation that the soft magnetic layer exhibit magnetic anisotropy without any means of biasing, and Claim 34 to include the limitation that the soft magnetic underlayer be non-biased and also magnetically anisotropic. The soft magnetic underlayer of the present invention has an internal anisotropy mechanism, rather than relying on interfaces between other layers or an external biasing means to inhibit the formation of magnetic domain walls and to provide the single domain state. The structure of Litvinov utilizes an external biasing means, namely magnetic rings 26 and 28, shown in Figure 2, to induce a magnetic field in the soft magnetic underlayer to provide a single magnetic domain state. The Applicants submit that the present invention is distinguished from the Litvinov reference by the addition of the limitation that the soft magnetic underlayer be magnetically anisotropic in the absence of any biasing means. Therefore, the Applicants

respectfully submit that the rejection of Claims 14, 19, 25, 34-36, 42 and 43 based on non-statutory double patenting grounds has been traversed.

The Examiner has rejected Claims 1, 14 and 34 under 35 U.S.C. § 112, first paragraph, for failing to comply with the written description requirement. The Examiner states in paragraph 7 of the Office Action that the addition of the phrase "inherently magnetically anisotropic" when applied to the soft magnetic underlayer renders the claims unpatentable under § 112 because of insufficient support for the inherent limitation, due to the Examiner's broad interpretation thereof. As a result, the Applicants have removed the limitation in all claims that the soft magnetic layer be inherently magnetically anisotropic and have included a limitation in all independent claims that the soft magnetic underlayer be magnetically anisotropic in a non-biased state, or, in the absence of a biasing means. The application outlines several prior art methods of achieving a single domain state within the soft magnetic underlayer. These include: (1) applying an external field inside the disk drive generated by, for example, hard magnets; (2) exchange coupling of the soft magnetic underlayer to a hard magnetic layer; (3) exchange coupling of the soft magnetic underlayer to an antiferromagnetic; and (4) generating noncrystalline soft magnetic underlayers with grain sizes compatible or smaller than those in a recording media. These methods can be found on page 3 of the application, in paragraph 6 and 7. At the top of page 4 of the application in paragraph 8, it is stated that the single magnetic domain state of the soft magnetic underlayer is generated via an internal anisotropy mechanism rather than relying on interfaces. An internal anisotropy mechanism would also eliminate the need for external means for biasing the soft magnetic underlayer; the limitation "non-biased", therefore, excludes any external means of biasing. The soft magnetic underlayer of the present invention is made magnetically anisotropic in one of two ways. The first method involves a flash annealing process which may be performed on the soft magnetic underlayer prior to the deposition of the actual recording surface to maximize the magnetic properties of the soft magnetic underlayer.

This is discussed in paragraph 26 and shown in Figure 4 of the present application. The second method involves depositing the soft magnetic underlayer in multiple layers either directly on top of each other or separated by layers of tantalum. This is discussed in paragraph 32 of the present application. As a result, the soft magnetic underlayer becomes magnetically antistrophic in its as deposited state, and no means of biasing is necessary to maintain the antistrophic condition, either external or internal.

The Examiner has rejected Claims 29 and 30 under 35 U.S.C. § 112, first paragraph, in paragraph eight of the Office Action. In response, the Applicants have cancelled Claims 29-30.

Claims 1, 14, 34 have been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite because of the ambiguous meaning of the word "inherent." The same arguments as applied above with respect to the rejection under § 112, first paragraph, apply here as well.

In paragraph eleven, the Examiner has rejected Claims 14, 34-36 and 43 under 35 U.S.C. § 102(e) as being anticipated by Litvinov and under § 102(f) because the Applicant did not invent the claimed subject matter. In response, the Applicants note that the independent claims of the application as amended are distinguished from Litvinov, as discussed with respect to the rejection for obviousness type double patenting, and therefore the rejections under §§1-2(e & f) should be rendered moot thereby.

The Examiner has rejected Claims 19, 20, 25 and 42 under 35 U.S.C. § 103 as not being directed to an invention which is patentably distinct from Claims 1 and 2 of commonly assigned patent Litvinov. As a result of the amendments to the Claims herein, the Applicants respectfully submit that Claims 19, 20 and 25, as being dependent upon Claim 14 and Claim 42 as being dependent upon Claim 1 are now patentably distinct from Litvinov as Litvinov provides a means for biasing, namely, magnetic rings 26 and 28, while Claims 1 and 14 of the present application specify the use of a non-biased soft magnetic underlayer. Therefore, the Applicants respectfully submit that the claim rejection under 35 U.S.C. § 103 has been traversed.

Additionally, Claims 19, 20, 25 and 42 are rejected under 35 U.S.C. § 103(a) as being obvious over Litvinov in view of Howard. For the same reasons as discussed in the paragraph immediately proceeding, Claims 19, 20, 25 and 42 have been distinguished from Litvinov by the addition of the "non-biased" limitation and therefore, the rejection under 103(a) in view of Howard should also be traversed.

In paragraph 15, the Examiner has rejected Claims 14, 25, 34-37, 42 and 43 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 4,687,712 (Sugita, et al.) in view of U.S. Patent 6,395,413 (Ando) and U.S. Patent 5,942,342 (Hikosaka, et al.). In addition, the Examiner has rejected Claims 1-3, 9-10, 32, 38, 40 and 45-47 under 35 U.S.C. § 103(a) as being unpatentable over Sugita in view of Ando and Hikosaka, et al. and additionally in view of U.S. Patent 6,468,670 (Ikeda et al.). The Examiner states that Sugita discloses the invention with the exception of the soft magnetic underlayer acting as a single magnetic domain. However, Ando and Hikosaka both teach that it is known in the art to eliminate domain walls in soft magnetic underlayers to prevent Barkhausen noise. The Applicants respectfully submit that both Ando and Hikosaka require external biasing means to eliminate the magnetic domain walls within their respective soft magnetic underlayers. With respect to Hikosaka, et al. the Applicants draw the Examiner's attention to Column 9, lines 22-34 in which it is explained that the elimination of the domain walls in the soft magnetic film is due to exchange coupling between soft magnetic film 12 and an antiferromagnetic film 14, which is shown in Figure 4. Therefore, the soft magnetic film 12 of Hikosaka is not non-biased as is the soft magnetic underlayer claimed by the Applicants. Likewise, Ando requires a pinning layer to eliminate the formation of domain walls in the soft magnetic layer. Therefore, the soft magnetic underlayers of both Hikosaka and Ando do not achieve a magnetically anisotropic state without a biasing mechanism, as does the soft magnetic underlayer of the present application. As a result, the combination of Sugita, Ando,

Hikosaka and Ikeda fails to disclose or render obvious a non-biased soft magnetic underlayer which is magnetically anisotropic.

The Examiner has rejected Claims 4-6, 12, 13, 19, 20, 29, 30, 33 and 41 under 35 U.S.C. § 103(a) as being unpatentable over Sugita in view of Ando, Hikosaka and Ikeda as applied above and further in view of Howard. The Examiner utilizes Howard to show that Ti and Ta are known equivalents in the field of non-magnetic spacing materials. The Applicants respectfully submit that these claims, as being dependent upon parent claims which the Applicant now believes to be patentable in view of the amendments herein and the remarks above, should also be patentable.

The Examiner has rejected Claims 7-8, 15-18, 21 and 39 under 35 U.S.C. § 103(a) as being unpatentable over Sugita in view of Ando, Hikosaka and Ikeda, et al. as applied above and further in view of several other references, all of which are used to show that the amount of cobalt, iron and boron in a CoFeB soft magnetic underlayer can be varied to effect the soft magnetic properties thereof, which the Examiner claims is well known in the art. However, the Applicants are not relying on varying amounts of various elements in the alloy to effect the magnetic properties thereof and, in fact, no known combination of varying amounts of cobalt, iron and boron in an alloy will result in an alloy which is magnetically anisotropic and lacking magnetic domain walls unless the layers are manufactured in accordance with one of the two methods disclosed in the present application namely, multiple layers of FeCoB wherein each layer is ~80 nm in thickness or less, or depositing several layers of the FeCoB alloy interspersed with nonmagnetic spacing material or depositing a large (~240 nm) layer of the FeCoB alloy and flash annealing after deposition. The Applicants respectfully submit that, absent these techniques, no teaching exists of a non-biased alloy of FeCoB that is magnetically anisotropic.

CONCLUSION

The Applicant has modified independent Claims of the application to specify that the soft magnetic underlayer described in the structures herein be *non-biased and also magnetically anisotropic*, as opposed to being forced into a magnetically antistrophic state by pinning layers or other biasing means. This modification to the claims distinguishes the claims of the present invention from all combinations of cited prior art and the Applicants respectfully submit that, as a result of these amendments and the remarks provided above, all currently pending claims of the application are now in condition for allowance and respectfully request a Notice of Allowability for all currently pending claims at the earliest possible time.

Should the Examiner have any questions regarding these amendments or any of the claims or remarks herein, the Applicant requests that the Examiner contact the Applicants' attorney using the contact information listed below.

Respectfully Submitted,



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